

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

PLAN OF WORK

SURVEY OF THE WATERSHEDS of the ISLAND OF HAWAII



U. S. DEPARTMENT OF AGRICULTURE
in cooperation with the
STATE OF HAWAII

AD-33 Bookplate
(1-63)

NATIONAL

**A
G
R
I
C
U
L
T
U
R
A
L**



LIBRARY aM1694
292927 .A6H3

PLAN OF WORK
SURVEY of the WATERSHEDS
of the
ISLAND OF HAWAII

UNITED STATES DEPARTMENT OF AGRICULTURE

Economic Research Service

Forest Service

Soil Conservation Service

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY

MAR 21 1970

C & R-PREP.

In Cooperation with

STATE OF HAWAII

Department of Land and Natural Resources

May 1969

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
DESCRIPTION OF BASIN	2
STATUS OF WATERSHED AND RELATED PROGRAMS	5
PROBLEMS AND NEEDS	9
OBJECTIVES, SCOPE, AND EXPECTED RESULTS	12
MAJOR ELEMENTS OF THE SURVEY	13
GENERAL PROCEDURES FOR THE SURVEY	16
USDA AGENCY RESPONSIBILITIES	19
ACTIVITIES OF COOPERATING ORGANIZATIONS	21
ARRANGEMENTS FOR COORDINATION	22
ADMINISTRATION OF THE SURVEY	23
PROGRESS REPORTS	25
SCHEDULE OF PLANNED ACTIVITIES	26

INTRODUCTION

The State of Hawaii has requested that the U. S. Department of Agriculture undertake a survey of the agricultural, rural, and upstream aspects of the watersheds on the island of Hawaii. This survey will be made under the provisions of Section 6 of the Watershed Protection and Flood Prevention Act (PL-566). The Act authorizes the Secretary of Agriculture "in cooperation with other Federal and with States and local agencies to make investigations and surveys of the watersheds of rivers and other waterways as a basis for the development of coordinated programs."

This survey, designated as a Type IV Survey by the USDA and the Federal Water Resources Council, will provide information on the aforementioned aspects of the island's watersheds. It will consider other related resource studies, surveys, and interpretations that will be helpful in coordinating USDA programs contributing to the orderly growth and development of the island of Hawaii.

The Administrator, Soil Conservation Service, has designated that the Hawaii State Conservationist, SCS, assume field responsibility for the Department's participation in the survey. Representatives of the Economic Research Service, Forest Service, and the Soil Conservation Service have also been designated to serve on the USDA Field Advisory Committee (FAC), which will coordinate all work between the agencies. The survey will be prepared by the USDA survey staff, with general guidance from the FAC. The survey staff will be comprised of personnel from the SCS, ERS, and FS.

The County of Hawaii, encompassing the island of Hawaii, was designated a redevelopment area in 1961. The County has been attempting to improve its economic condition and has had moderate success. Rapid and sustained economic development has long been envisioned by the County. The island today is faced with the opportunity for great growth and expansion. The pathway is through orderly development of its principal industries of sugar, cattle raising, diversified agriculture and tourism. Realizing the value of a survey of the island's watersheds on agricultural development, the County Council passed a formal resolution supporting the State's request for information on the agricultural, rural, and upstream aspects of the island's water and related land resources under the provisions of Section 6, P.L. 566.

DESCRIPTION OF BASIN

Physical Data

The basin to be studied is the island of Hawaii, the largest land mass in the Hawaiian Islands, with an area of 2,579,000 acres and 313 miles of shoreline. Geologically the youngest island in the Hawaiian chain, Hawaii was formed by the flows from five volcanoes--Mauna Kea, Mauna Loa, Hualalai, Kohala, and Kilauea. Mauna Loa and Kilauea are still active, while the others are considered dormant.

The island topography is generally smooth and sloping with no deep erosional dissections except in the northern sections. Here, along the windward side of the Kohala Mountain and the Hamakua Coast, the combination of high rainfall with older volcanic flows as well as a deep ash surface layer has led to the formation of deep gorges. Marine action on the land mass has created sea cliffs ranging from 50 to 350 feet in height along the northern coastline. In areas where there have been recent volcanic flows, the land is barren with large areas of exposed lava. Cliffs have been formed in some sections of the island by numerous faults and rifts, but on the whole, the island is uncarved by geologic erosion. Generally, lava materials are highly porous and allow a substantial part of the rainfall to permeate to the subsurface.

Volcanic rocks (either aa or pahoehoe), cinders and ash form the basic materials from which the soils of Hawaii have developed. The Great Soil Groups found on the island include: Hydrol Humic Latosols, Humic Latosols, Red Desert, Reddish Brown, Reddish Prairie, Latosolic Brown Forest, Regosols, Alluvial, and Lithosols.

Wide variations in temperature and rainfall characterize the climate on the island of Hawaii. Temperatures range from an average of 75°F. at sea level to near freezing at the summits of Mauna Kea and Mauna Loa, approximately 14,000 feet above sea level. Average annual rainfall ranges from less than 10 inches in the Kawaihae area to more than 300 inches on the mountain slopes above Hilo.

The sloping island terrain has placed limitations on land use. For the most part, towns have developed along coastal margins, agriculture on the lower and midslopes, and cattle grazing and forests on the higher slopes. The majority of the land falls in three classifications: forest land, comprising 40 percent; pasture and grassland, 18 percent; and cropland, 5 percent. The remainder of the island consists of barren lava land, comprising 29 percent, and urban and built-up areas, highways and Federal land, about 8 percent. The County of Hawaii has two deep-water harbors and three airport facilities. The harbor and airport in the county seat of Hilo handle most of the sea and air traffic. These facilities service the island for sugar, cattle and other agricultural exports, and capital and consumer goods imports.

Economic Data

Hawaii '68, Economic Developments in the 50th State, an annual economic report published by the Bank of Hawaii, summarizes the economy of the island of Hawaii as follows:

"Sugar plantations located on the eastern coastal districts, including Hilo, produced 439,853 tons of sugar valued at about \$70 million in 1967. This combined output is the largest in the State. The value of diversified agriculture production in 1967 amounted to \$17.7 million, or more than one-third of the State total. The island of Hawaii also is the largest beef producing area in the State. Beef marketed last year totaled \$7.2 million, and accounted for 61 percent of the State total. Other livestock production last year was valued at \$2.5 million.

"Marketings of vegetables and fruits amounted to \$4.0 million, and coffee \$1.6 million. The value of macadamia nut production increased to \$1.9 million last year, representing an eightfold growth in the past decade.

"The direct air link between Hilo and the Mainland, which opened on October 1, 1967, will stimulate exports of papayas, tropical flowers, foliage and other perishables.

"Extensive resort and supporting residential projects are now under construction or in the planned stages between Kawaihae and Kailua-Kona on the westcoast of the island.

"Future developments which will further broaden the base of the island's economy, depend on results of feasibility studies now underway for a 30,000 barrel-a-day oil refinery and for the production of pulp from bagasse (fibrous material byproduct of the extraction of juice from sugar cane stalks), which could eventually lead to local production of paper. Construction of a new bulk cement distribution plant will get underway sometime this fall."

The Bank of Hawaii report also states that tourist expenditures and construction have increased considerably on the island of Hawaii. Tourist expenditures totaled an estimated \$26.2 million in 1967, nearly four times the level five years earlier. Construction increased 75 percent during this period and the value of building permits stood at \$15.3 million in 1967.

According to the State Department of Health, the 1967 population of Hawaii County was 65,941. Based on a growing economy, this figure is expected to reach 80,000 in 1971. The major population growth areas are expected to be Hilo City, South Kohala, and North and South Kona.

Per capita personal income on the island of Hawaii is lower than the national average, ranging from 33.7 percent lower in 1956 to 14.5 percent lower in 1965. The median income for island families was \$4,866--24 percent lower than the Statewide family median income of \$6,366. The substandard income is reflected in the designation of poverty areas on the island by the Office of Economic Opportunity. Each of these areas, Keaukaha in Hilo, Lanakila Homes in Hilo, and the Kona District, is presently served by OEO with Community Action Programs.

STATUS OF WATERSHED AND RELATED PROGRAMS

There are many ongoing watershed and related programs on the island of Hawaii. The wide acceptance of these programs gives evidence that the people of the island are well aware of the need for the conservation and wise use of their land and water resources.

Soil and Water Conservation District Program

There are five Soil and Water Conservation Districts actively carrying on programs of resource conservation on the island of Hawaii. These districts, under the administrative support of the State Department of Land and Natural Resources, are making major contributions in protecting and improving the land, and controlling and preventing misuse of land and water resources.

Created by State law, the districts are legal subdivisions of the State and are managed by a board of local people. The five districts cover the entire island and include 2,640 farms, ranches, and plantations. The majority of these operations have at one time or another received assistance from the districts.

The Soil Conservation Service provides technical assistance to the districts. Full-time SCS personnel are headquartered in Hilo, Honokaa and Kainaliu. They assist the landowners and operators in planning and applying locally adapted conservation programs. Other technical assistance is also provided to the districts by other Federal and State agencies.

Cooperative State and Private Forestry Programs

The Division of Forestry, Hawaii Department of Land and Natural Resources, has carried out programs of watershed protection and improvement of 700,000 acres of the island since its beginning in 1893.

During this early period, the forest lands were ravaged by large populations of wild cattle, sheep, and goats. One of the first steps to rehabilitate these areas was the establishment of the Forest Reserves in the most critical watershed areas. The reserves were fenced and the wildlife populations reduced. Tree planting was started on the denuded land.

Since then, the Division of Forestry has widened its scope of operation. Expanding population and economic growth necessitates a change to intensive management for greater use. Today, it has a multi-objective to provide the people of Hawaii with desirable resources from her forests and forest lands. This new management policy will require harmonious integrating of different land uses, all of which will have an effect and impact on the water resource.

The Division, in cooperation with the Forest Service, USDA, conducts programs of forest fire protection; insect and disease control; recreation; forage production; and watershed, wildlife habitat, and timber management on state-owned lands.

Through the Cooperative Forest Management program, also with the Forest Service, the Division provides professional services to private forest landowners and forest industries.

Watershed Protection and Flood Prevention Act (PL-566)

The Naalehu, Puukapu, and Kona watershed projects are located on the island of Hawaii. Land treatment and structural measures are included in these work plans, and nearly all of the planned measures have been installed in the Naalehu and Puukapu watersheds. In addition, preliminary investigations are in progress for two other watersheds--Wailuku-Alenaio and Waiohinu.

The PL-566 program provides a coordinated plan for controlling flood runoff and sediment production, preventing land erosion, promoting and stabilizing agricultural developments and protecting the homes, lives, and businesses of the people of the island.

The program is administered by the Soil Conservation Service.

Agricultural Conservation Program

This USDA program provides Federal cost sharing for installation of conservation practices of public benefit. Soil and water conservation practices applied under this program have contributed materially to the reduction of soil erosion.

The program is administered by the Agricultural Stabilization and Conservation Service. For the most part, technical assistance to farmers and ranchers is provided by the Soil Conservation Service, and by the Hawaii Division of Forestry as an agent for the Forest Service.

Watershed and Soil and Water Conservation Loan Program

The Farmers Home Administration of the USDA can make soil and water conservation loans to farmers and ranchers. These loans are authorized to help provide adequate financing for soil conservation, water development, water conservation, forestation, drainage, establishing and improving permanent pasture, and related measures.

Loans are also available to local sponsors of P.L. 566 watershed projects to help them finance their share of the project cost.

Information and Education

Education work with farmers and ranchers on soil and water conservation is carried on through the Agricultural Extension Service. The Service also provides information and advice on farm improvement, livestock and crop production, and farm management.

Research and Inventories

Research in soil and water technology, studies in resource economics, and inventories of natural resources are being conducted by many agencies, including:

- Agricultural Research Service, USDA
- Soil Conservation Service, USDA
- Forest Service, USDA
- Economic Research Service, USDA
- Geologic Survey, USDI
- Environmental Sciences Service Administration, USDC
- Hawaii Agricultural Extension Service, University of Hawaii
- Water Resources Research Center, University of Hawaii
- Land Study Bureau, University of Hawaii
- Dept. of Land and Natural Resources, State of Hawaii
- Dept. of Planning and Economic Development, State of Hawaii
- Hawaiian Sugar Planters' Association
- Pineapple Research Institute

Other Programs

A flood plain information study for the Kaumana-Punahoa Area in the South Hilo watershed has been completed by the U. S. Army Corps of Engineers. This study, authorized under Section 206, Public Law 86-645, furnishes essential information related to floods so that proper flood plain use can be exercised and flood damage lessened.

The Wailoa Stream and Tributaries Flood Control Project, authorized by Section 203, Flood Control Act of 1954, was installed with the assistance of the U. S. Army Corps of Engineers to help alleviate the flood problem along the Wailoa River in the city of Hilo.

The Corps of Engineers also have a multiple-purpose survey underway for Waipio Valley on the northern coast of the island. This survey, authorized under the River and Harbor Act of 1962 (P.L. 87-874), is to consider all aspects of multiple-purpose development and improvement of the stream and basin.

Under the Water Resources Planning Act (P.L. 89-80), the Department of Land and Natural Resources, State of Hawaii, is being provided planning funds for a comprehensive water survey of the island of Hawaii.

Also, comprehensive water and related land resources planning on a Statewide basis will soon be initiated under the program of the Federal Water Resources Council. The undertaking will be a multi-agency effort involving Federal, State, and County agencies and will culminate in the development of a comprehensive "framework" plan for the orderly development of the water and related land resources of the entire State. A preliminary plan of study has already been prepared and the study will get underway as soon as authorization is received from the Council.

PROBLEMS AND NEEDS

Although the County of Hawaii is now faced with the opportunity for rapid and sustained economic development, there are several problems which have slowed the growth of the island.

Flooding is a serious problem in a majority of the watersheds on the island. Floodwater and sediment have caused damages to crops, land, property and public utilities, and have endangered lives. The threat of flood damage has hampered residential, industrial and urban development in many areas.

Erosion and consequent sedimentation are also severe problems in over half of the watersheds on the island. During major storms, considerable soil losses have occurred from open newly planted or harvested agricultural fields. Erosion presents a dual hazard since it threatens production potentials of upland soils and also creates off-site problems that reduce development potentials of lowland areas. Especially evident among these off-site problems has been the sediment pollution of coastal waters which has resulted in destruction of marine life and discoloration of these waters and adjacent beaches. These polluted areas have thus been rendered unattractive for swimming, fishing, diving, and sunbathing.

Another major problem hampering the island's growth is the management and control of surface and ground water to provide adequate supplies for irrigation, stockwater, and rural water needs. Since the rainfall pattern of the island exhibits extreme ranges over short distances, floods may be occurring in one area of the island, while drought conditions prevail in other areas. Adverse topographic and geologic conditions on the island have also posed problems in storing water in reservoirs and in transferring water from one area to another.

For the forested portions of the watersheds there is a need to develop programs to install forestry measures designed to improve water quality, increase yield of usable water, and minimize erosion, while at the same time improve the quality and quantity of the forest resource to meet increasing demands for goods and services from these lands.

Recognizing the challenges that lie ahead, the County of Hawaii has prepared an Overall Economic Development Program (OEDP) designed to move the island's economy to higher levels of income and employment. The OEDP report, prepared by the County Department of Economic Development, points out their problems, including those mentioned above. The report further sets forth the goals, objectives, and programs which will help to promote the growth and development of the County.

Comprehensive long-term objectives to protect and conserve the island's resources have also been developed by the five Soil and Water Conservation Districts. These district programs reiterate the problems hampering growth of the County and enumerate action programs for development of the County's water, woodland, wildlife, and recreational potentials. The programs reflect the districts' awareness of the desirability for sound planning and coordinated development to meet present and future demands.

The Hawaii Conservation Needs Inventory (CNI), completed in March, 1968, reaffirms the problems and needs pointed out by the OEDP and the Soil and Water Conservation Districts. The CNI is part of a national inventory of soil resources and uses, soil and water conservation problems, and extent of conservation work needed. The watershed phase of this inventory provides information on numbers and locations of areas needing project activity under P. L. 566, the nature of the problems and the urgency of the need. The following table is a summary of the watersheds CNI findings. Numbers of watersheds having water and related land problems and those needing project-type action to solve their problems are listed. A map showing the 26 delineated watersheds and the location of the problem areas needing project action are shown on page 11A.

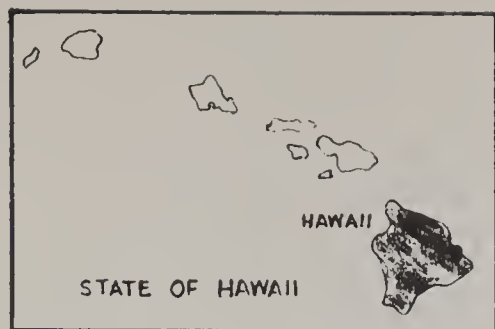
THE HAWAII CONSERVATION NEEDS INVENTORY

Summary of Watershed Problems and Needs for
Island of Hawaii

March 1968

Problems	:	:	:
	:	:	: Watersheds Needing
	:	:	: Watersheds : Project Action or
	:	:	: Having : Development to
	:	:	: Problems : Alleviate Problems
<hr/>			
1. <u>Flood Prevention</u>			
a. Floodwater and sediment damage	15	12	
b. Erosion damage	14	10	
2. <u>Agricultural Water Management</u>			
a. Drainage	7	5	
b. Irrigation	9	6	
c. Rural water supply	16	16	
3. <u>Nonagricultural Water Management</u>			
a. Municipal or industrial water supply	4	4	
b. Recreation development	7	7	
c. Fish and wildlife development	7	7	
d. Water quality control	4	4	
<hr/>			

Note: Total number of delineated watersheds on island = 26.



WATERSHED BOUNDARY

WATERSHED PROBLEMS AND NEEDS:

F - Floodwater & Sediment Damage

E - Erosion Damage

D - Drainage

1 - Irrigation

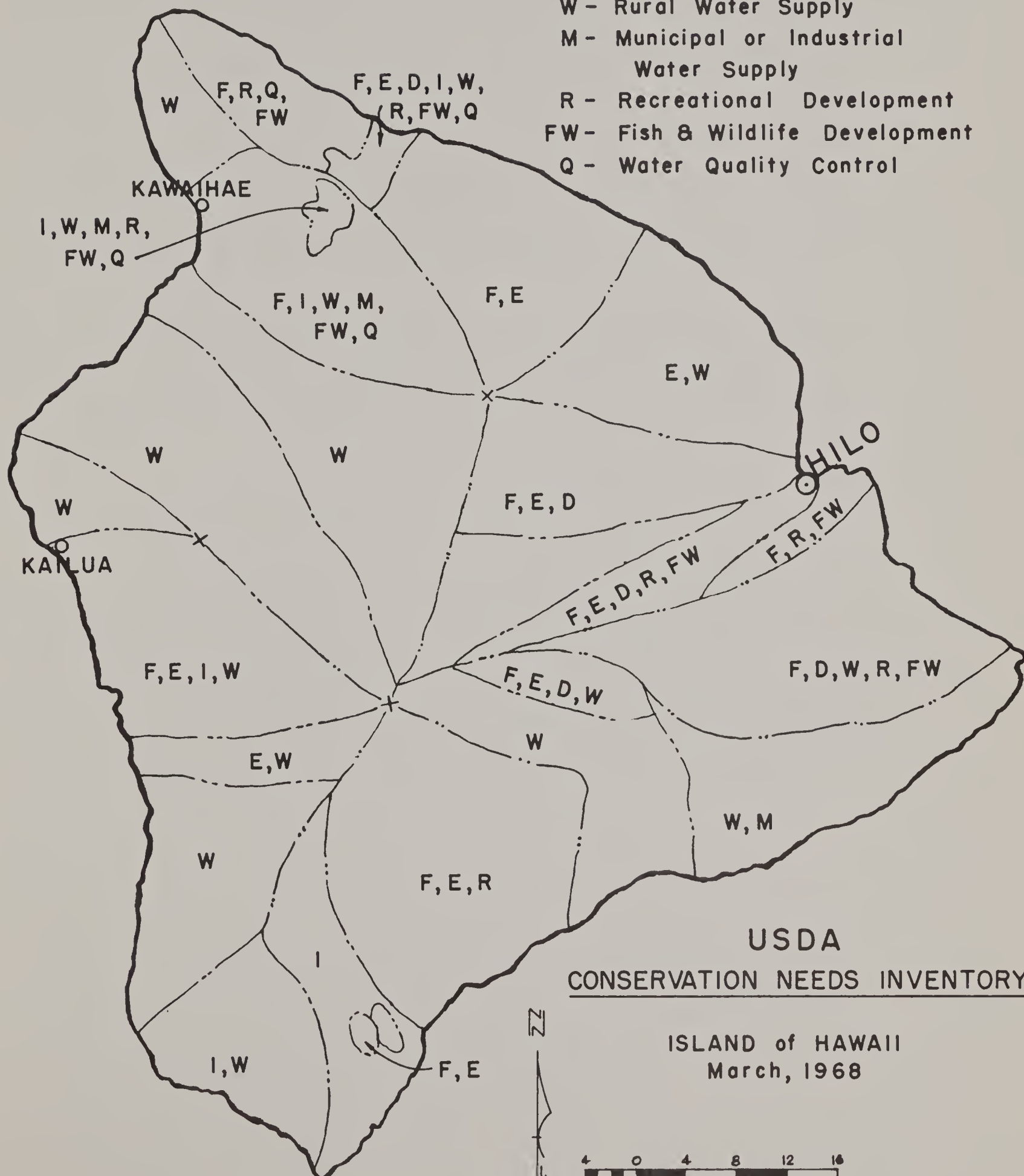
W - Rural Water Supply

M - Municipal or Industrial
Water Supply

R - Recreational Development

FW- Fish & Wildlife Development

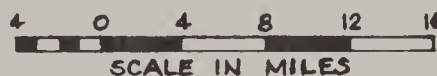
Q - Water Quality Control



USDA

CONSERVATION NEEDS INVENTORY

ISLAND of HAWAII
March, 1968



OBJECTIVES, SCOPE, AND EXPECTED RESULTS

The objective of the survey is to facilitate the coordinated and orderly conservation, development, use, and management of the agricultural, rural, and upstream aspects of the island's watersheds. This end will be served by: (1) appraising the availability of agricultural water and related land resources, (2) studies and projections of economic development, (3) translating these projections into needs for the available resources, and (4) identifying USDA approaches that appear appropriate to satisfy the needs.

USDA programs formulated in the survey will serve to promote economic growth and orderly development of the County of Hawaii. These developments will be consistent with overall State and National objectives. Components of these programs will help to meet current and long-term agricultural needs for resource development and use.

Information developed in the survey may be used in making land use decisions and in determining USDA programs and priorities for installation of works of improvement. Erosion, sediment and land treatment information may be used as the base for developing conservation programs to satisfy portions of the State's water quality standards.

The survey will draw upon data developed by other agencies in their water and resource planning efforts.

The USDA planning efforts will be closely coordinated with the State, County, and other local organizations through the Department of Land and Natural Resources. Field consultations with agencies concerned with the development, use, and management of water and land resources will be accomplished. Full consideration will be given to the desires and objectives of local interests. Through these efforts, the survey report will provide a framework within which needed USDA projects can be developed in proper relationship other Federal, State, and local programs.

MAJOR ELEMENTS OF THE SURVEY

Major elements of the survey will consist of the following:

1. Studies and projections of economic development.

The economic base study will be used to aid in the appraisal of current and projected problems and to assess needs for development of agricultural water and related land resources.

Economic projections will be developed for the survey area and will include:

- a. Volume and value of agricultural output, including timber production.
- b. Income and employment in basic agricultural and forestry activities.
- c. Employment, income, and other measures of economic activity that are directly, indirectly, or locationally related to agricultural industries.
- d. Land use pattern of rural lands, including acreages devoted to major crop groups, timber production, recreation, fish and wildlife, and watershed protection.

2. Determination of needs for watershed development.

The current and future needs for development of agricultural water and related land resources will be determined by:

- a. Physical inventory and analysis of the nature, distribution, and areal extent of rural community and agricultural problems. Estimates of future needs based on the problems will be made after projections of population, land use production, and income have been completed.
- b. Appraising economic losses sustained from these problems under present and projected land uses.
- c. Estimating the economic need for developments and determining, either quantitatively or qualitatively, the foregone economic opportunities in the absence of development.

3. Appraisals of the availability of agricultural water and related land resources.

The appraisal of water supplies will be done with respect to both quantity and quality. USDA will collaborate with other agencies doing hydrologic studies to determine current water supplies and projections of future water availability for agricultural and related uses. An appraisal of the present and potential extent of sediment pollution affecting all waters will be made.

The current and future land requirements for all agricultural and forest uses will be estimated. Soil survey maps, descriptions, and interpretations being compiled by the Soil Conservation Service will be used to compare land needs with available land types and capabilities. The Hawaii forest type maps and reports, compiled cooperatively by the Forest Service and the Division of Forestry, Hawaii Department of Land and Natural Resources, will be used to compare the current and projected forest land requirements with available land use classes and existing forest cover types.

4. Description of the characteristics of watershed problems and general solutions.

The causes, extent, frequency, economic and social consequences of major current and projected watershed problems will be described. A summary of problems, needs, economic losses caused by the problems and needs, development potentials, costs of development, and other factors related to watershed development will provide the basis for discussion of general approaches to solution of these problems.

Potential solutions will include either structural or non-structural measures, both project and nonproject type action programs. Studies will identify areas in which potentially feasible upstream watershed projects (P.L. 566), RC&D, and other USDA programs may help meet development needs.

USDA investigations will: (a) identify watersheds where the agricultural and rural community water and related land resource problems require special consideration in establishment of priorities for subsequent detailed planning, (b) indicate the nature and importance of inter-agency coordination of upstream programs, and (c) provide information and data which will be usable in future studies and action programs.

5. Identification and evaluation of watershed projects which need to be initiated during the next 10 to 15 years.

The watershed areas having apparent project opportunities under USDA programs will be identified. Detailed watershed investigation will not proceed until after consultation with the State Department of Land and Natural Resources.

The nature, scope, and intensity of the detailed watershed investigations will be generally in accord with that followed in making preliminary investigations of small watershed projects under Public Law 566. These examinations will be sufficient to show tentative locations, costs, benefits, and the salient physical characteristics for the major structural and land treatment improvements recommended.

GENERAL PROCEDURES FOR THE SURVEY

The USDA River Basin Survey Staff, under the general guidance of the Field Advisory Committee, will develop and follow a work outline to complete the survey in an orderly and timely manner. The listing of the Major Elements outlines the general process involved in accomplishing the objectives of the survey.

The survey staff will compile available basic data and obtain additional needed data through reconnaissance-type field surveys and interviews in order to develop: (a) an inventory of existing agricultural water and related land resources, (b) economic studies and projections, and (c) an inventory of rural community and agricultural water problems.

The prime building blocks for the survey will be the basic inventory of existing resources, economic base, and projections of population, industry, income, and other pertinent factors. The needs and demands for agricultural water and related land will be based on these projections and the basic inventory of problems. With the inventory of available resources and multiple needs compiled, the basis for identifying sound agricultural water and related land development opportunities will be available. Major emphasis will be placed on those measures that can be accomplished through USDA programs and assistance.

The following is a summary of engineering, economic, and other studies anticipated in accomplishing the survey. The studies will be in sufficient detail to determine the potential that exists to help solve the watershed water and related land resource problems and to meet the agricultural needs of the island.

Economic Development-- Economic studies will involve:

Compilation from secondary sources of current land use, output, and employment of agricultural activities and related major nonagricultural activities.

Projections of major agricultural land uses and of outdoor recreation. Projections will adopt and employ material developed by the State of Hawaii to the maximum extent possible.

Economic appraisal of alternative land and water development plans. Selected development opportunities such as irrigation or ranch land clearing will be budgeted with projected prices.

Economic appraisal of impacts of alternative land and water development plans through a simplified model of inter-industry and industry-household relationships.

Flood Prevention--Detailed field studies are not contemplated; however, some fieldwork may be involved in obtaining and updating data.

Parts of the basic water resource inventory studies, consisting of flood frequency curves, peak flows, runoff, and other pertinent data available, will be used in the flood prevention analysis. Additional hydrologic studies will be necessary to develop data for specific areas. Needed structural and land treatment measures will be identified and evaluated as to physical and economic feasibility.

Irrigation--Determine total irrigated, irrigable, and potentially irrigable lands using basic resource inventory studies, including soils information, Hawaii CNI, land use and capability data, and hydrologic data on water supply, temperatures, and quality.

Land Drainage--Present and future problem areas will be identified through interpretation of soil survey maps, CNI, and other data. Studies will indicate extent and adequacy of present systems and feasibility of proposed measures.

Rural Water Supply--The projections of livestock, agricultural and forest-based industries, and rural population will be used in determining future requirements of rural water supply. These will be combined with existing hydrologic data on surface water and groundwater availability to compare the water supply with future requirements.

Water Quality--Emphasis will be placed on sediment pollution affecting all waters. The inventory of sediment pollution problems will utilize available data, supplemented by checks of field indicators. The survey will include: (a) location of critical erosion or sediment producing areas, (b) estimation of present and future erosion and sediment yield rates, (c) identification of present and future sedimentation problem areas, and (d) adaptation of available information showing kinds and amounts of watershed management needed to stabilize watershed lands.

Recreation--Outdoor recreation needs involving all agricultural and forest lands will be analyzed and projections of visitor-day demands developed. These demands will be classed into types of activities and general location, and then translated into needs for land and water areas and related facilities. Means to satisfy these needs will then be developed and analyzed as to their impact upon agricultural, forest, and rural lands as well as the related water problems.

Land Resources and Use--All lands on the island will be tabulated and mapped by soil capability classes, using such data as soil survey maps, the CNI, Hawaii forest type maps and related reports. Land use, land status, and soils information will also be presented.

USDA AGENCY RESPONSIBILITIES

Soil Conservation Service

The Soil Conservation Service will have the overall responsibility for the survey and in cooperation with the Forest Service and Economic Research Service, will be responsible for:

1. Making physical appraisals of present and projected agricultural, rural, and related water problems and resource development needs and defining them.
2. Determining the problems and treatment needs for lands in the area.
3. Determining the development potentials of rural areas, including the physical and economic feasibility of watershed projects.
4. Evaluating the physical and economic effects of USDA projects.

Economic Research Service

The Economic Research Service will develop and be technically responsible for the following aspects of the survey, including arrangements for appropriate technical consultation and assistance from staff members of the Soil Conservation Service, Forest Service, and other cooperating Federal and State agencies. The listing constitutes the general scope within which the economic investigations will be conducted.

1. Compiling and analyzing data relative to the economic base of the study area.
2. Analyzing and projecting:
 - a. Economic activity in the agricultural sector of the economy.
 - b. Other agriculture-related economic activities in both the urban and rural areas.
 - c. The demand for land and water resources in projected economic activities in the rural areas.
3. Appraising economic impacts of development plans and alternatives on agricultural, rural, and related sectors of the economy.

4. Assessing current and projected demands for goods and services obtainable from the use of water and related land resources and the translation of such demands into economic needs for development.
5. Cooperating with other services to develop a desirable pattern for future agricultural water and related land use, management, and development, and to formulate and evaluate USDA program alternatives and plans for the area.

Forest Service

The Forest Service will be technically responsible for the following phases of the study in cooperation with the Soil Conservation Service and the Economic Research Service.

1. Determine present cover conditions and present and future use, treatment, development, and management of forest, woodland, and mountainous wild lands.
2. Determine the hydrologic characteristics of forested lands of the island and appraise the modification in runoff, erosion, and sediment production which may occur with different land uses and levels of management.
3. Develop specific recommendations for remedial programs and management guidelines for upstream watershed development.
4. Make the analysis of the forest resource section of the economy.
5. Determine present and future water requirements of forest based industry.
6. Assess the impacts of proposed water resource development projects upon the forest resources and forest based enterprises of the island.
7. Develop projections of forest-based industry and employment in consideration of recommended program generated changes.
8. Evaluate the potentials of the forest resource for recreation developments and wildlife habitat, and recommend appropriate practices.

ACTIVITIES OF COOPERATING ORGANIZATIONS

The Hawaii Department of Land and Natural Resources, through its Division of Water and Land Development, will coordinate the USDA planning efforts with State, County, and other local organizations. The Division has actively participated in the development of this Plan of Work in order to attain mutual understanding and agreement of the objectives, priorities, and extent of participation of the cooperating agencies. Current State studies pertaining to comprehensive planning of the water resources of the island of Hawaii may provide useful data and information on availability problems and needs for agricultural water supply.

The Council of the County of Hawaii formally resolved to support the State in its request for the survey. The County of Hawaii will be consulted frequently to reflect the local needs, define objectives and also to provide available information.

ARRANGEMENTS FOR COORDINATION

Overall coordination within the U. S. Department of Agriculture will be a function of the USDA Field Advisory Committee. The FAC will be represented by personnel from the Soil Conservation Service, Forest Service and Economic Research Service. The SCS representative will act as Chairman of the FAC.

To effectively coordinate the work and check on progress, the Chairman will call meetings of the FAC. Reports and progress statements will serve to keep the Washington Advisory Committee and the parent Services informed of the status of the work. The designated agency representatives of the FAC will follow their regular channels in handling specific matters of concern to their own agency.

The FAC will assure proper coordination with local agencies. All reports resulting from the meetings of the FAC will be made available to the Hawaii State Department of Land and Natural Resources and the County of Hawaii for informational purposes. In addition, the Department will be invited to initiate meetings with the FAC to review the progress of the survey and offer pertinent comments.

ADMINISTRATION OF THE SURVEY

The Soil Conservation Service has overall responsibility for administration of the U. S. Department of Agriculture's activities in connection with this survey.

Major responsibilities of participating USDA agencies as well as working procedures to insure survey efficiency have been established in a "Memorandum of Understanding between the Soil Conservation Service, and Forest Service and the Economic Research Service pertaining to Comprehensive River Basin Planning," dated April 15, 1968. In keeping with the Memorandum, the USDA Field Advisory Committee (FAC) has been established.

The FAC will provide guidance for the Department's participation in the survey and maintain close field working relations among the three departmental agencies. The Committee will also consider budgetary needs, outline procedures consistent with national standards, and review reports and progress statements by the Survey Staff. Members of the USDA Field Advisory Committee for this survey are:

Fred A. Haughton, Chairman
State Conservationist
Soil Conservation Service
Honolulu, Hawaii

John D. Beebe
Chief, Division of State & Private Forestry
U. S. Forest Service
San Francisco, California

Clyde E. Stewart
Field Group Leader
North West Resource Group, NRE
Economic Research Service
Logan, Utah

The funding of the Department's participation in this survey is broken down as follows:

<u>Agency</u>	<u>FY-1969</u>	<u>FY-1970</u>	<u>FY-1971</u>	<u>Total</u>
Soil Conservation Service	\$49,800	\$ 75,000	\$ 82,790	\$207,590
Economic Research Service	10,000	27,450	27,710	65,160
Forest Service	<u>10,000</u>	<u>20,550</u>	<u>20,577</u>	<u>51,127</u>
	\$69,800	\$123,000	\$131,077	\$323,877

The budget distribution reflects the agency costs for carrying out their responsibilities in the survey. The SCS budget, however, also includes the costs for stenographic and clerical services, physical facilities overhead, and publications.

The Soil Conservation Service will assign a staff leader, a civil engineer and an assistant civil engineer to the Survey Staff. They will have the responsibility for accomplishing the portions of the survey outlined previously for the SCS. The economist, hydrologist, and soil scientist from the SCS River Basin and Watershed Planning Staff will also be assigned certain segments of the SCS survey responsibilities. Technical guidance and assistance will be available from the State Program Services Staff and from the Engineering and Watershed Planning Unit in Portland, Oregon.

The Economic Research Service will assign an agricultural economist to the Survey Staff. He will be responsible for conducting the economic investigations and analyses outlined for the survey. This agency will also provide supervision, technical guidance and assistance, and other supporting services at the Field Advisory Committee and Washington, D. C. levels.

The Forest Service will assign a forester to the Staff. He will be responsible for the forestry aspects of the survey. Technical guidance will be available from the staff of the Forest Service Institute of Pacific Islands Forestry located in Honolulu and the Regional Office of the Forest Service in San Francisco, California.

PROGRESS REPORTS

A progress report will be prepared at the end of each quarter of the year by the survey staff. This report will indicate the progress on scheduled activities, new or revised schedule of activities, and other pertinent information. The report will be transmitted to the FAC, who will review it and then submit it to the Washington Advisory Committee. Within-agency distribution will be by the respective agency representatives. All other distribution will be made by the FAC and a copy of the report will be sent to the Hawaii State Department of Land and Natural Resources for informational purposes.

Special reports on specific activities may be requested by the FAC and the State from time to time. Such requests will be made through the FAC Chairman.

SCHEDULE OF PLANNED ACTIVITIES

The FAC will meet at least once in each fiscal year for the duration of the survey preparation. This meeting will be scheduled during the last half of each fiscal year and will be held in Honolulu, Hawaii. The FAC Chairman will schedule the meetings and make other necessary arrangements. He will also call for additional meetings as the needs arise and arrange for special meetings of the FAC with the State Department of Land and Natural Resources when such meetings are requested by the latter.

The following schedule of activities, except for the first period, has been prepared on a six-month basis. Subsequent refinements, rescheduling, and additions will be presented in an annual up-dating of the Plan of Work.

August - December, 1968

SCS begins staff acquisition to complete Plan of Work.
Complete Plan of Work.
Hold initial FAC meeting in November.

January - June, 1969

Obtain final approval, sign and publish Plan of Work.
Complete staffing needs for survey.
Complete Work Outline.
Acquire available basic data.
Appraise available resources.
Hold regular FAC meeting.

July - December, 1969

Identify watersheds needing more intensive investigations.
Complete economic base study and preliminary projections.
Delineate problem areas and determine area needs.
Begin Plan formulation for the island and for specific watersheds.

January - June, 1970

Complete generalized determination of needed measures.
Draft main sections of the report.
Hold regular FAC meeting.

July - December, 1970

Complete program impact determinations.
Complete watershed investigations.
Complete main report sections.


January - June, 1971

Prepare final reports.
Publish and distribute the reports.
Hold final FAC meeting for the USDA Survey of
the Watersheds of the Island of Hawaii.

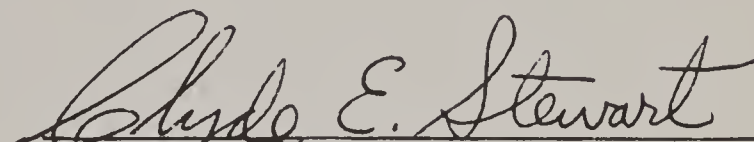
The Plan of Work for the USDA Survey of the Watersheds
of the Island of Hawaii was prepared by:

USDA Field Advisory Committee

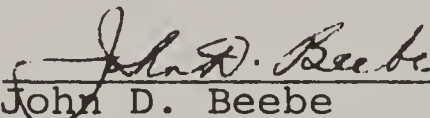
May, 1969



Fred A. Haughton
Chairman, FAC and
State Conservationist
Soil Conservation Service
Honolulu, Hawaii

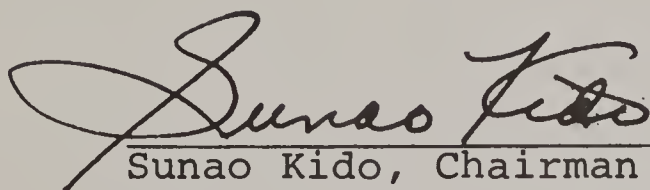


Clyde E. Stewart
Member, FAC and
Field Group Leader
North West Resource Group, NRE
Economic Research Service
Logan, Utah



John D. Beebe
Member, FAC and Chief
Division of State and Private
Forestry
Forest Service
San Francisco, California

The State of Hawaii concurs in the above Plan of Work.



Sunao Kido, Chairman and Member
Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

